DXP Series

Digital Cinema Hardware User Manual

DXP — Digital Expansion Processor

TD-000371-00-A

EXPLANATION OF SYMBOLS

The term "**WARNING!**" indicates instructions regarding personal safety. If the instructions are not followed the result may be bodily injury or death.

The term "**CAUTION!**" indicates instructions regarding possible damage to physical equipment. If these instructions are not followed, it may result in damage to the equipment that may not be covered under the warranty.

The term "**IMPORTANT!**" indicates instructions or information that are vital to the successful completion of the procedure.

The term "**NOTE**" is used to indicate additional useful information.

The intent of the lightning flash with arrowhead symbol in a triangle is to alert the user to the presence of un-insulated "dangerous" voltage within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to humans.

The intent of the exclamation point within an equilateral triangle is to alert the user to the presence of important safety, and operating and maintenance instructions in this manual.

IMPORTANT SAFETY INSTRUCTIONS

WARNING!: TO PREVENT FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE.

1. Maximum operating ambient temperature is 50°C (122°F).
2. Never restrict airflow through the device vents. Please insure that the side panel vents are unobstructed.
3. When installing equipment into a rack, distribute the units evenly. Otherwise, hazardous conditions could be created by an uneven distribution of weight.
4. Connect the unit only to a properly rated supply circuit. The DXP is suitable for connection to 100-240VAC, 50-60Hz with no special considerations other than the appropriate IEC power cord.
5. Reliable earthing (grounding) of rack-mounted equipment should be maintained.

FCC Statement

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warranty (USA only; other countries, see your dealer or distributor)

QSC Audio Products 3 Year Limited Warranty

QSC Audio Products, LLC ("QSC") guarantees its products to be free from defective material and/or workmanship and will replace defective parts and repair malfunctioning products under this warranty when the defect occurs under normal installation and use, provided the unit is returned to our factory, one of our authorized service stations or an authorized QSC International Distributor via pre-paid transportation with a copy of proof of purchase (i.e., sales receipt). This warranty provides that the examination of the return product must indicate, in our judgment, a manufacturing defect. This warranty does not extend to any product which has been subjected to misuse, neglect, accident, improper installation, or where the date code has been removed or defaced. QSC shall not be liable for incidental and/or consequential damages. This warranty gives you specific legal rights. This limited warranty is freely transferable during the term of the warranty period. The warranty on QSC products is NOT VALID if the products have been purchased from an unauthorized dealer/online e-tailer, or if the original factory serial number has been removed, defaced, or replaced in any way. Damage to, or loss of any software or data residing on the product is not covered. When providing repair or replacement service, QSC will use reasonable efforts to reinstall the product's original software configuration and subsequent update releases, but will not provide any recovery or transfer of software or data contained on the serviced unit not originally included in the product.

Customers may have additional rights, which vary from state to state or from country to country. In the event that a provision of this limited warranty is void, prohibited or superseded by local laws, the remaining provisions shall remain in effect.

The QSC limited warranty is valid for a period of three (3) years from date of purchase in the United States and many (but not all) other countries.

For QSC warranty information in countries other than the United States, contact your authorized QSC international distributor. A list of QSC International distributors is available at www.qscaudio.com.

To register your QSC product online, go to www.qscaudio.com and select "Product Registration". Other questions regarding this warranty can be answered by calling, e-mailing or contacting your authorized QSC distributor.

Phone: 1-800-854-4079 within US and Canada, +1-714-754-6175 international, **Email:** warranty@qscaudio.com, **Website:** www.qscaudio.com.

RoHS Statement

The DXP products are in compliance with European Directive 2002/95/EC – Restriction of Hazardous Substances (RoHS).
The DXP products are in compliance with "China RoHS" directives. The following chart is provided for product use in China and its territories:

	DXP					
部件名称 (Part Name)	有毒有害物质或元素 (Toxic or hazardous Substances and Elements)					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(vi))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
电路板组件 (PCB Assemblies)	X	O	O	O	O	O
机壳装配件 (Chassis Assemblies)	X	O	O	O	O	O

O：表明这些有毒或有害物质在部件使用的同类材料中的含量是在 SJ/T11363_2006极限的要求之下。

O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.

X：表明这些有毒或有害物质在部件使用的同类材料中至少有一种而含量是在SJ/T11363_2006极限的要求之上。

X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.

Introduction

The DXP adds new capabilities to the DCP line of Digital Cinema Processors, creating a powerful solution for today's networked D-Cinema audio systems. From server to speakers, the DCP and DXP combine to offer a complete set of tools to facilitate all the signal processing, audio distribution, monitoring and automation control services required in a modern D-Cinema sound system.

A single DXP provides all signal processing and monitoring functions for up to 12 DCA Amplifiers connected via DataPort connectors. The DXP also offers relays and contact closure inputs to interface with automations and other theatre systems like masking, dimmers, and curtain, as well as a Mic/Line input to facilitate connection of podium microphones in multi-use facilities.

The DCP and DXP communicate via CobraNet on a standard Ethernet infrastructure. Up to two DXP's may be connected to each DCP. The DXP requires a DCP for operation.

The DXP provides advanced DSP presets for QSC's Digital Cinema Speakers (DCS), the DXP optimizes loudspeaker performance while simplifying cinema sound system wiring and configuration. The DXP can provide crossovers for bi-amp, tri-amp or quad-amp operation or it can be used to power full range systems like surround channels.

The use of standard Ethernet infrastructure allows the power amplifiers for the screen channels and subwoofers to be mounted near the speakers, eliminating long and expensive speaker cables and conduit. The DataPort connection through the DXP allows the remote-mounted amps and speakers to be fully monitored and controlled from the DCP.

The DCP/DXP combination is more than an audio processor. Whether designing a system for a single auditorium or designing a large multiplex, the DCP and DXP together offer the flexibility in configuration, networking, audio distribution and advanced management services to get the job done.

Features

- The DXP accepts 16 Digital inputs via CobraNet. It supports crossover processing for up to 5 screen channels or up to 6 Auxiliary (point source) channels.
- Analog Mic/Line Input
- Compatible with all existing QSC DCA amplifiers
- Dual internal power supplies seamless recovery in the event of a failure
- Continued development of software and firmware will add new capabilities via easy updates

Digital Signal Processing

The DXP digital signal processing capability outperforms traditional analog crossovers and equalizers for optimized speaker performance. Crossover frequency, parametric equalization, polarity, delay and gain can be precisely adjusted for each speaker in your system. Active 2-way, 3-way and 4-way crossovers are available. Advanced crossover presets for QSC DCS speakers speeds system set-up and ensures maximum performance. Full range outputs for surround channels are also supported.

Less Wiring, Faster Setup

The DXP greatly simplifies system wiring and setup, significantly reducing installation time and labor cost. Input to the DXP is provided via standard Ethernet hardware via CobraNet from the associated DCP. Digital audio is routed over the network from the DCP to the DXP. The use of QSC's HD-15 DataPort cables to connect the DCA amplifiers to the DXP speeds installation as all traditional XLR and barrier strip terminations are eliminated.

DCP and DXP processors simplify setup by using a menu-driven, PC-based software program for configuration. The program includes a speaker data file that lists default parameters for popular cinema speaker models. Commonly used configurations can also be saved on a disk, or redistributed across a network, allowing easy transfer of settings to the DXP. All configuration data may be saved to an SD memory card in the DCP, allowing easy transfer of settings to a new (backup) DCP or DXP, should replacement ever be required.

Advanced Monitor and Control Functions

In addition to audio monitoring of amplifier inputs and outputs, the DXP includes QSC's exclusive "load fault" detection. The DXP monitors all amplifier outputs and indicates opens and shorts in the speaker system, providing confirmation that all amplifier outputs are functioning properly. In addition, the DXP detects all amplifier clipping and protect modes, and heat sink temperature. The DXP can also turn amps off and on, and control external devices via the four relay outputs.

DCP Connect applications for iOS and Android mobile devices provide system control, fault reporting, and diagnosis, accessible through remote wi-fi network access throughout a cinema multiplex.

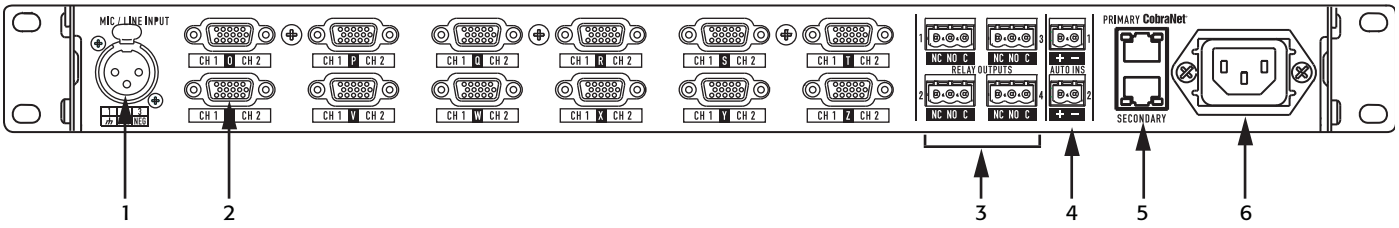
DXP Front Panel Features

– Figure 1 –

Refer to the "Front Panel User Interface" on page 6 for details on using the PAGE and SET buttons.

1. LCD display
2. Page button – navigates through LCD pages and setting options
3. Set button – changes the parameters as accessed by the Page button
4. LED Power indicator – illuminates green when on
5. LED Status indicator –
   a. Red = loss of audio, and loss of control connection
   b. Green = audio and control connections are both good
   c. Amber = either the audio or control connection is not working.

DXP Rear Panel Features



– Figure 2 –

1. Analog audio input – Mic/Line
2. DataPort interface for QSC amplifiers – supports up to 12 single port amplifiers
3. Relay outputs – mechanically decoupled control outputs (curtain, lighting control etc.)
4. Automation inputs – contact closure inputs (control presets, levels etc.)
5. 100 Mbps Ethernet ports – CobraNet™ audio network - Primary and Secondary (backup)
6. IEC inlet – AC mains power connector with cord lock

Front Panel User Interface

The majority of the configuration for the DXP is performed in the DCP. There a few things that can be changed using the DXP front panel, but the primary purpose of the LCD and the Page and Set buttons is for status. The following is a breakdown of what you can do and see using the front panel user interface. Press the PAGE button to move from page to page. Press the SET button to change to edit mode and to modify settings.

NOTE: The DXP ID must be set via the DXP front panel. This identifies the DXP to the DCP. When creating the configuration in DCP Manager that includes this DXP, the same ID must be specified on the DXP configuration page (Aux/DXP tab in DCP Properties form). **If there is more than one DXP on the CobraNet network, each must have a unique ID.**

Page	DXP State / Notes	LCD Display	Settings
1	Initial Boot Connected and configured	QSC DXP QSC DXP n (1 or 2) Network name of connected DCP	Status Only Press PAGE to move to next page.
2	Initial boot Connected and configured	ID: nn OFFLINE ID: nn ONLINE	Press SET cursor moves under first digit of ID number Press SET to cycle numbers 0-9 for the first digit Press PAGE to move to second digit of ID number Press SET to cycle numbers 0-9 for the second digit Press Page cursor moves under Y of Save? Y:N Press SET to save and restart the DXP, or Press Page to move cursor to N Press Set to exit edit mode without saving Press PAGE to move to next page.
3	N/A	SN xxxxxxxxx (Serial Number) FW: 0.00.0000 (Firmware Version)	Status only Press PAGE to move to next page.
4	N/A	Amp Power ON OFF	Press SET cursor moves to ON Press SET to turn the amps on. Press PAGE to move the cursor to OFF Press SET to put the amps in standby Press PAGE to move to Exit Press SET to exit edit mode Press PAGE to move to next page, or press SET to start over.
5	N/A +48 VDC phantom power	MIC POWER OFF (ON)	Press SET to toggle between ON and OFF Press PAGE to move to next page.
6	N/A	MIC SENSITIVITY 27 dBu	Press SET to cycle through the choices: 27 dBu 21 dBu 10 dBu -16 dBu Press PAGE to move to next page.
7		AUTO. INPUTS CC1=0 CC2=0	Status only Press PAGE to move to next page.
8	N/A	RELAY: 1 2 3 4 O O C C	Press SET to move cursor to Relay #1. Press SET to toggle between O(pen) and C(lose) Press PAGE to move to Relay #2. Press SET to toggle between O(pen) and C(lose) Continue in this manner. After setting Relay #4, Press PAGE to move to Ex. Press SET to exit edit mode Press PAGE to move to next page, or press SET to start over.
9	N/A	Contrast 1 - 8	Press SET to toggle through the choices. 1 is high contrast, 8 is low contrast. Press PAGE to move to next page.
10	Connected and configured No Connection	CobraNet TX RX OK OK – – – –	Status only Press PAGE to move to next page.
11	– – indicates power supply failure	POWER A B OK OK – – – –	Status only Press PAGE to move to first page.

Unpacking

Remove your DXP product from its carton and inspect it carefully. Make sure that the carton contents are complete and that there are no signs of shipping damage. It is recommended that you keep the original packing materials for reuse in the rare event that service is required. If service is required and the original packing material is not available, ensure that the unit is adequately protected for shipment (use a strong box of appropriate size, sufficient packing/padding material to prevent load shifting or impact damage) or call QSC's Technical Services Group for replacement packing material and a carton.

DXP Product Carton Contents

1. DXP
2. Hardware User Manual
3. IEC power cord and wire cord retainer
4. Euro style connector plug kit

Mounting

The DXP product is designed to be mounted in a standard 19" (480 mm) equipment rack and requires 1 vertical rack space (1 RU) (refer to IEC 60297 for additional rack dimensions and design details). Rack mounting provides the DXP with stability and a convenient means for dressing the cables connecting to the product. Some rack systems also provide climate control and/or conditioned power.

Rack mount the DXP product by supporting it from underneath while aligning the four front panel mounting holes (in the rack ears) with the threaded screw holes in the rack rails. Install all four mounting screws and washers and tighten securely. The DXP product comes with rear rack support ears. Ensure that these rear mounting points are securely fastened to rear rack rails or rack side walls.

Configuring the DXP

DCP Manager™ is used to configure the DCP/DXP system. This includes configuring the device properties, the DSP objects, audio and control I/O and Presets. The network communications properties and audio networking features can also be configured using DCP Manager™. Refer to the DCP Hardware User Manual for instruction on the installation of DCP Manager, and the DCP Manager™ application Help Files for additional information on product configuration, management and network connectivity.

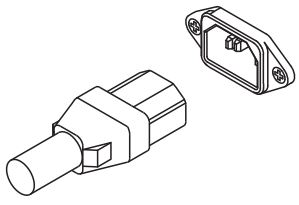
NOTE: The DXP does not store any configuration information – configuration information is loaded from the DCP whenever a valid control connection is established. Additionally, the DCP will perform any necessary firmware updates automatically when it connects to the DXP.

Once the basic DCP/DXP operating configuration is defined and all of the connections are in place, it's time to power up the rest of the rack, complete the DCP/DXP setup, tune the system and run through final check. Refer to additional information in this Hardware User Manual and in the software Help Files for further setup and configuration details to complete this step.

Configuration and Networking Connections

AC Power Cord

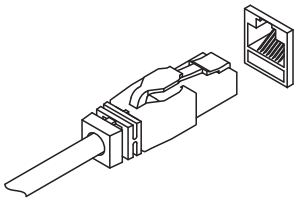
Insert the molded receptacle of the AC power cord into the AC power inlet on the back of the DXP product. Plug the AC line connector into an AC outlet. The power supply on the DXP product will accept from 100 to 240V, 50 to 60 Hz. If a different type of IEC power cord is required than that supplied with the product, consult QSC's Technical Services Group.



– Figure 3 –

CobraNet Network

Connect one end of a data communications cable terminated with an RJ45 plug into the CobraNet™ Primary receptacle on the rear panel of the DXP product. Ensure that the lock tab on the cable engages with the RJ45 receptacle on the rear panel DXP connector. For systems requiring redundant network connections, connect a second data communications cable terminated with an RJ45 plug into the CobraNet™ Secondary receptacle on the rear panel of the DXP product.



– Figure 4 –

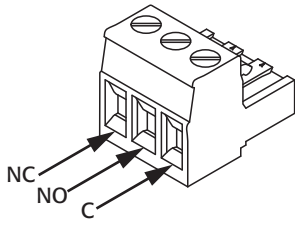
NOTE: Data communications cabling must be rated CAT-5 or better for all CobraNet™ connections.

Automation Inputs

The automation inputs use a 2-terminal Euro style (a.k.a. Phoenix) receptacle. The Automation Inputs can be connected to relay contacts or a switch and require a 2-terminal Euro style plug. The DXP rear panel label provides all necessary signal information. The negative terminal of each receptacle is at chassis potential.

Relay Outputs

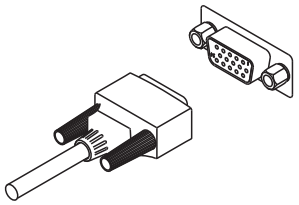
Four relay outputs are provided via two 3-terminal Euro style (a.k.a. Phoenix) receptacles. Relay contacts are floating and rated for 30 VDC at 1A. Each output includes one common terminal, one normally open contact (NO), and one normally closed (NC) contact. These terminals are labeled C, NO and NC, respectively on the DXP rear panel. When the relay is not energized, the C terminal is connected to the NC contact and the NO contact is not connected. When the relay is energized, the C terminal is connected to the NO contact and the NC contact is not connected.



– Figure 5 –

DataPorts

QSC DataPorts on the DXP rear panel are intended to interface to QSC amplifiers with v1 DataPorts. These are the all-capable DataPorts, which are included on DCA and PL3 series amplifiers. All DataPorts use the HD15 connector format and connect to QSC amplifiers via data communications cables having male HD15 connectors on both ends. These are commonly referred to as VGA cables. To connect a DataPort cable between a DXP DataPort and an amplifier DataPort, attach the cable's male connectors to the HD15 ports and finger tighten the thumb screws on the connectors.

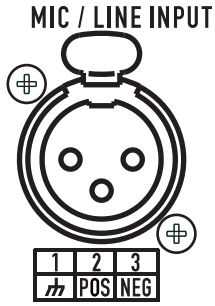


– Figure 6 –

NOTE: Although many off-the-shelf VGA cables may work with satisfactory results, the QSC DataPort specification requires that all conductors be present and that all audio I/O conductors be shielded. Therefore, only QSC supplied DataPort cables should be used. A variety of lengths are available through QSC's Technical Services Group.

Mic/Line Input

A single Mic/Line Input is accessible on the DXP rear panel. This input can be used for mono non-sync sources or for connecting a microphone for local paging or announcements into the auditorium or to support various corporate or live events requiring a microphone. Phantom power may be enabled via DCP Manager™ configuration or via the DXP front panel interface. The Mic/Line Input uses a standard 3-conductor XLR receptacle.



– Figure 7 –

NOTE: The Mic/Line input uses standard XLR cables that are readily available through retailers specializing in musical equipment, pro audio or home electronics.

Specifications

Refer to the individual sections in this document for more information. Specifications are subject to change.

Parameter	Specification
Dimensions (H/W/D):	1.75" x 19" x 15"
Line voltage requirements	100 VAC – 240 VAC, 50/60 Hz
Accessories included	6 ft. UL/CSA line cord, Connector Kit
Front Panel Controls	
LCD page forward	Momentary switch
Set parameter	Momentary switch
Indicators	
Power-on indicator	Green LED
Status indicator	Tri-color LED (Red, Green, Amber)
Menu-driven LCD	2 line x 16 character LCD
Rear Panel Connectors	
Universal Mic/Line input	XLR – Mic (+ phantom power) or line level Available sensitivity settings: -16 dBu, 10 dBu, 21 dBu, 27 dBu
DataPort outputs	HD-15 (x12) – QSC amplifier interface
Automation inputs	2-pin Euro-style (x2)
Relay outputs	3-pin Euro-style (x4) – max 30 VDC
CobraNet	RJ45 (x2) 100 Mbps primary/backup network audio
Audio Performance (Mic/Line Input)	
A/D conversion	24-bit delta-sigma, 48 kHz
Dynamic range (unweighted)	> 103 dB
Input stage type	Active balanced
Input impedance	Balanced: 6.81 k Ohms Unbalanced: 13.6 k Ohms
Max analog input level	-16 10 21 27 dBu 0.123 2.25 8.70 17.35 Vrms
CMRR typical (max)	20 Hz – 20 kHz >60 dB (>50 dB)
THD+N at 2 dB below clip (per AES-17)	<0.006%

Parameter	Specification
Audio Performance (DataPort Outputs)	
Dynamic range (unweighted):	>107 dB
THD+N at +12 dBu input level (per AES-17)	<.005 %
Frequency response	20 Hz to 20 kHz
D/A conversion	24-bit delta-sigma, 48 kHz
DSP Performance	
Filter topology	24-bit digital IIR
Crossover filters	Linkwitz-Riley or Butterworth (6 - 48 dB/octave)
Parametric EQ	Digital band-pass filter with ±20 dB of boost/cut. Q is programmable in 1/10th octave steps from 1/20th to 4 octaves
CD Horn EQ	Digital shelf filter with up to ±10 dB of cut/boost programmable from 20 Hz to 20 kHz
All pass filter	2nd order all pass filter programmable from 20 Hz – 20 kHz
Band polarity	Normal, inverted
Band delay	Programmable in 21 µs steps from 0 ms to 10 ms
Amplifier AC Control	All amps power on with DXP activation and can be placed into standby via user interface
Automation Inputs	
Input Type	TTL Compatible or Dry Contact Closure
Operating Mode	Connection to ground through a maximum impedance of 1 k Ohm for closure detect
Relay outputs	
Output type	Mechanical relay contacts
Compatible	Max 30 VDC output at 1 A. Can be wired as NO or NC
Audio network / Control connection to DCP	
Protocol	CobraNet version 2 protocol
Data rate	100 Mbps (Fast Ethernet)
Ports	1 Primary, 1 Backup (auto-failover)
Connection requirements	CAT-5 UTP cable or better (100 m maximum length), direct connection to wired network switch ports only, dedicated LAN or V-LAN

Mailing Address:

QSC Audio Products, LLC

1675 MacArthur Boulevard

Costa Mesa, CA 92626-1468 USA

Telephone Numbers:

Main Number: (714) 754-6175

Sales & Marketing: (714) 957-7100 or toll free (USA only) (800) 854-4079

Customer Service: (714) 957-7150 or toll free (USA only) (800) 772-2834

Facsimile Numbers:

Sales & Marketing FAX: (714) 754-6174

Customer Service FAX: (714) 754-6173

World Wide Web:

www.qsccinema.com

E-mail:

info@qscaudio.com

service@qscaudio.com

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